

**Schematic Design**  
**City of Sioux Falls - Light and Power Campus Enhancements**  
**CIP#20005**

5225 E. 60th St. Sioux Falls, SD  
February 21st, 2023



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## TEAM STRUCTURE

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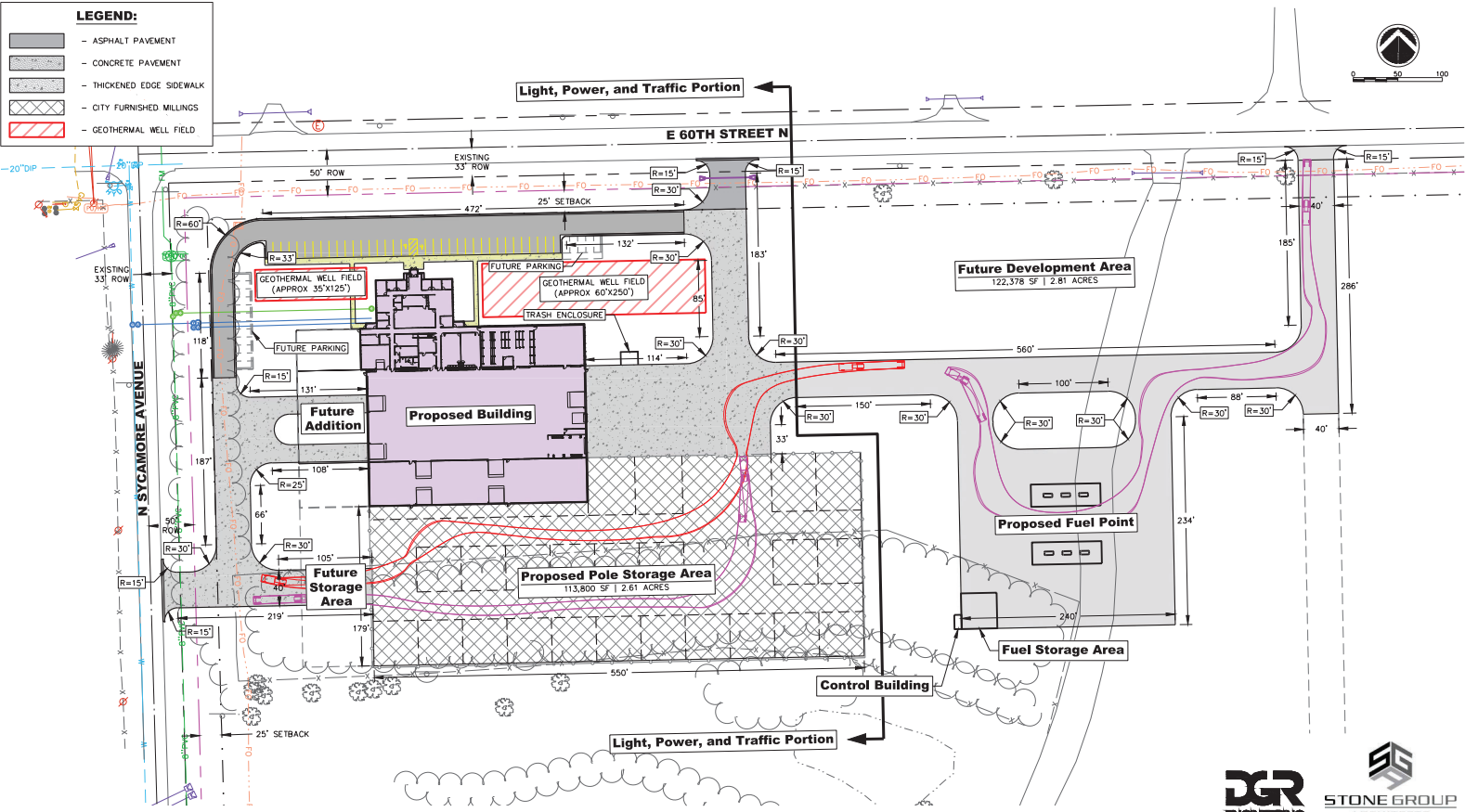
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# SITE PLAN

**LEGEND:**

-  - ASPHALT PAVEMENT
-  - CONCRETE PAVEMENT
-  - THICKENED EDGE SIDEWALK
-  - CITY FURNISHED MILLINGS
-  - GEOTHERMAL WELL FIELD



**DGR ENGINEERING**  **STONE GROUP ARCHITECTS**

## CONTEXT & CODE REVIEW

### LOCAL & ENVIRONMENTAL CONTEXT

The new location that is going to house the Sioux Falls Light, Power and Traffic building/s is zoned as industrial. The site is surrounded by Industrial to the South and West, Office/Institutional to the Northwest, and Open (agricultural) to the North and East. The site will need to be re-zoned to I-1 Industrial prior to a building permit being issued. To the southeast we also find the City of Sioux Falls Water Reclamation Plant. The site is located in the corner of 60th St & Sycamore Ave.

The Light, Power, and Traffic building is split into 4 main programming areas. These include the office areas, the workshop areas, the parking garage area, and the storage area. These differing programs are delineated by exterior materials. The office space has wood Nichiha panels, combined with Pac-Clad metal panels, and curtain wall systems. The workshop space has a combination of Nichiha panels and precast concrete panels with reveals, along with some corrugated metal siding. The garage portion and storage spaces are constructed of a pre-engineered metal building, so the exterior material is corrugated metal panels that attach to this building system. Large Kalwall skylights bring a large amount of natural light into the garage.

The site is divided in two distinct areas, on the north side we find the administration side, and on the south side the garage and cold storage. With the parking being located in the north side by the front entrance of the building.

### CODES & REGULATIONS

All design and Construction must conform of the City of Sioux Falls Adopted and Regulated Building Codes

- 2021 International Building Code (IBC) promulgated and published by the International Code Council (ICC)
- 2021 International Mechanical Code promulgated and published by the International Code Council (ICC)
- 2021 International Fuel Gas Code promulgated and published by the International Code Council (ICC)
- 2020 National Electrical Code (NEC) promulgated and published by the International Code Council (ICC)
- NFPA 13-R (Exception 8.14.1.2)
- 2015 Uniform Plumbing Code
- Standard for Accessible and Usable Building and Facilities ICC A117.1-2017
- 2009 International Energy Conservation Code (IECC)
- High-Performance Building Standard: Guidance for Design and Construction of Municipal Buildings (Published by the City of Sioux Falls)

### PROJECT SITE

Zoning: Industrial (I-1 Planned)

Physical Address:  
60th St. & Sycamore Ave. Sioux Falls, SD

Parcel ID: 371167

Legal:  
N1/2 NW1/4 (EX H1) 36-102-49  
SIOUX FALLS CITY UNPLATTED

Acres/Sq. Ft.:  
80.00 / 3,484,800.00

Owner Address:  
City of Sioux Falls  
224 W 9th St  
Sioux Falls, SD 57104

### CODE REVIEW

The 2021 IBC code was used to establish the following preliminary requirements as a single story sprinklered building

**Occupancy**  
Group S-2 & Business Group B

**Required Separation of Occupancies**  
1-hr

**Construction Type**  
II-B

**Allowable Height**  
75' (Sprinkled)

**Allowable # of Stories Above Grade**  
4 (B and S-2 Occupancy)

**Allowable Building Area**  
S-2 - Sprinkled One Story, 78,000 s.f.  
B - Sprinkled One Story, 69,000 s.f.

**Unlimited Area Building**  
Sprinkled, one-story building - Qualifies

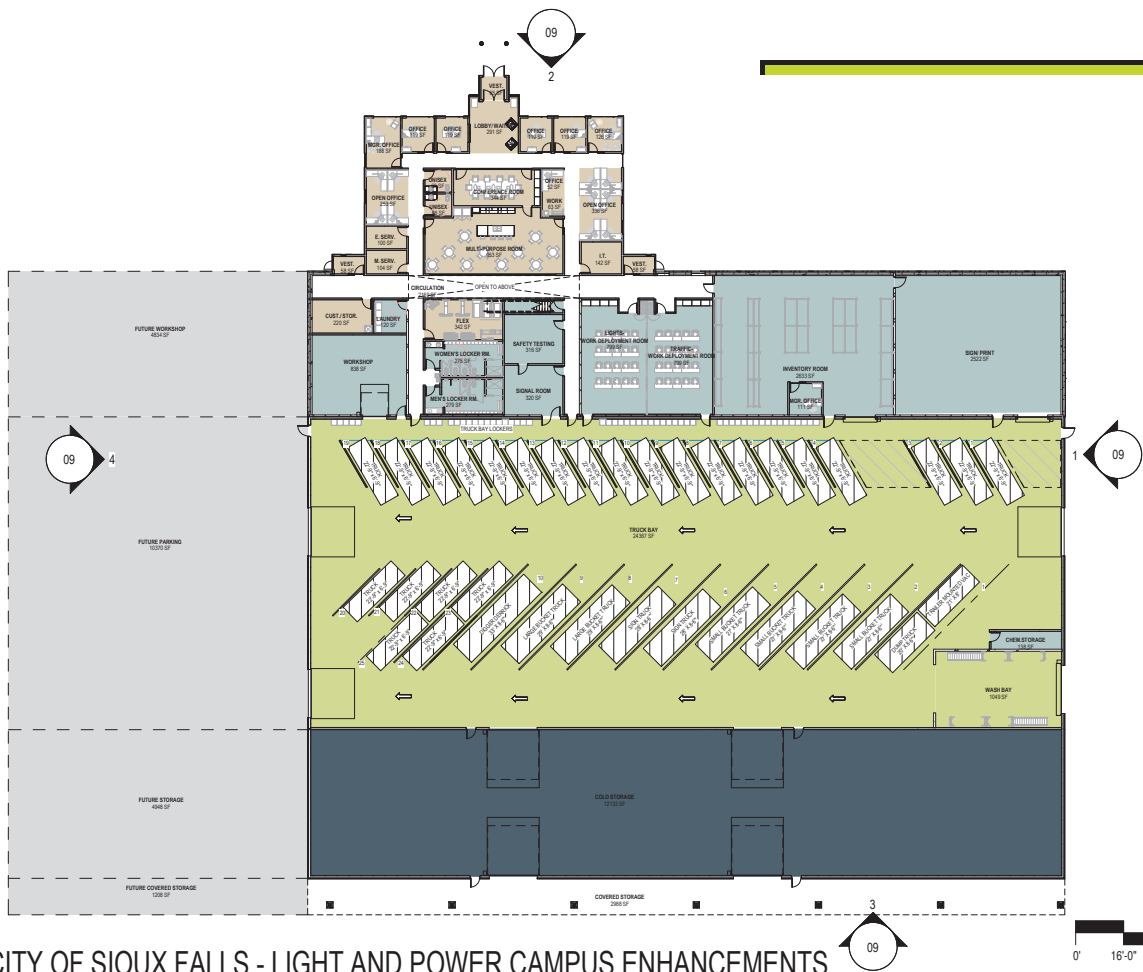
**Spaces with one Exit or Exit Access Doorway**  
155'

**Maximum Occupants Load of Space**  
66 Occupants

**Exit Access Travel Distance**  
300 feet with sprinkler system

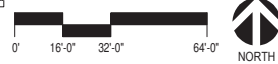
**Corridor Fire-Resistance Rating**  
0 Hours with sprinkler system

# FLOOR PLAN

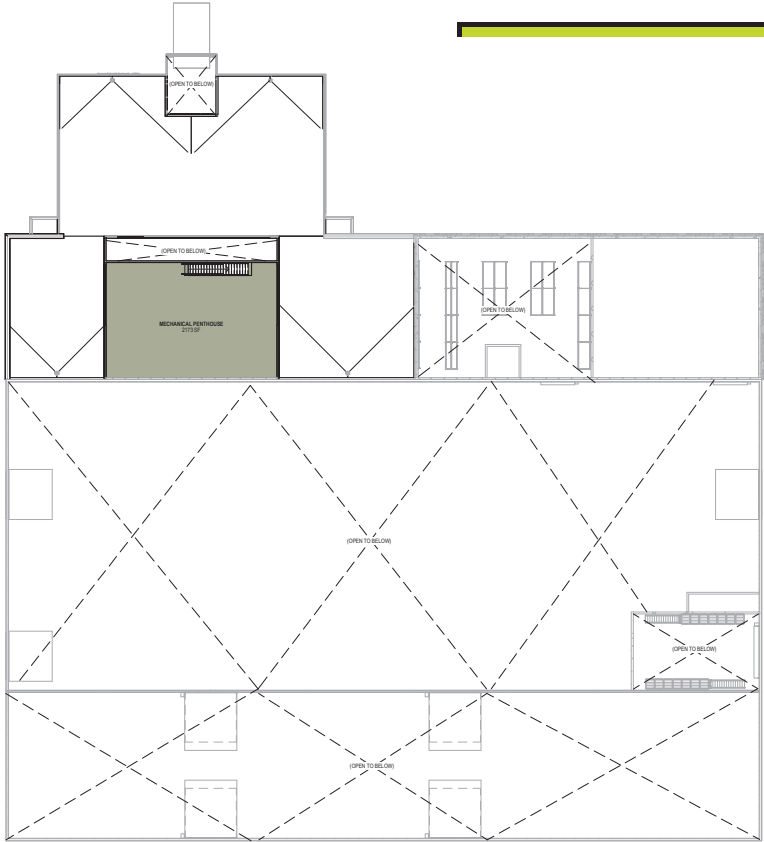


- PROGRAM AREAS**
- GARAGE
  - OFFICE
  - WORKSHOP
  - FUTURE
  - STORAGE

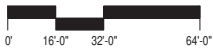
CITY OF SIOUX FALLS - LIGHT AND POWER CAMPUS ENHANCEMENTS



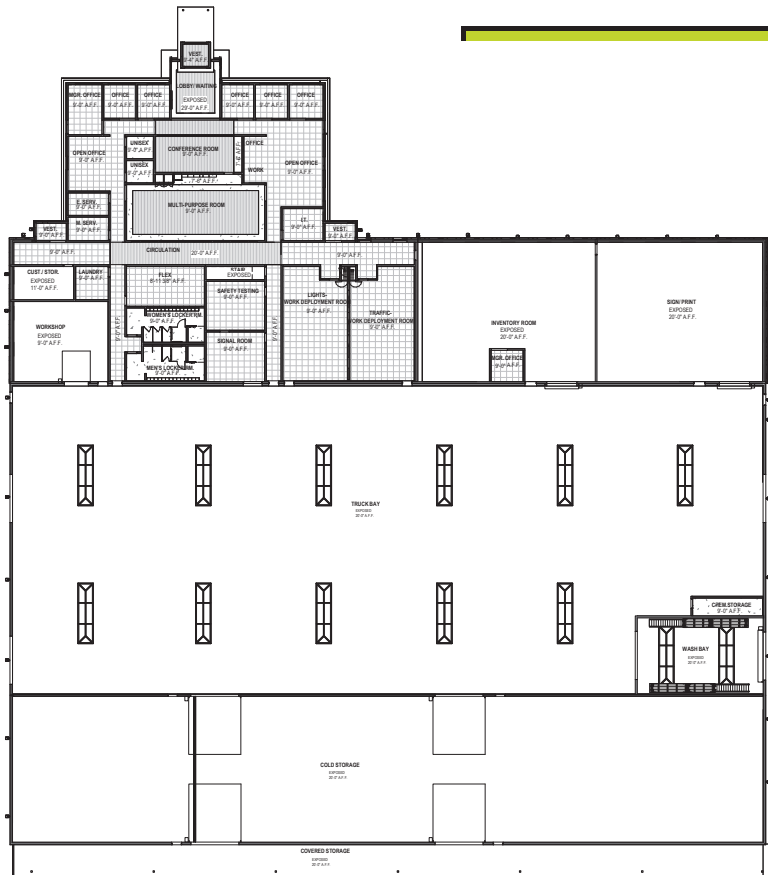
MEZZANINE PLAN



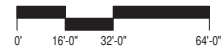
PROGRAM AREAS  
■ MECHANICAL



REFLECTED CEILING PLAN

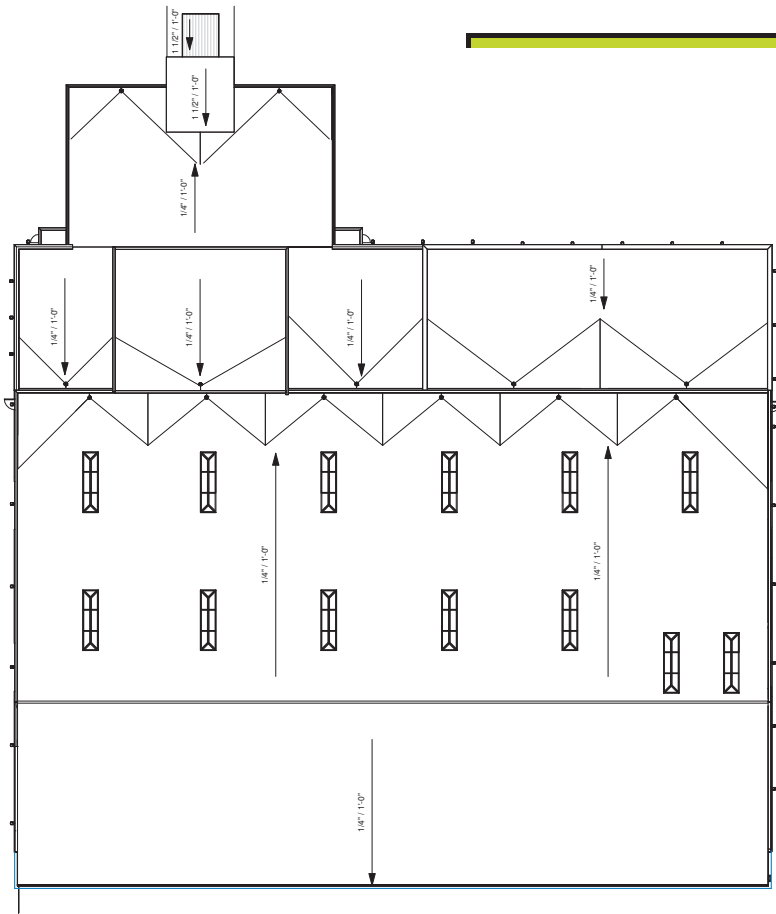


CITY OF SIOUX FALLS - LIGHT AND POWER CAMPUS ENHANCEMENTS





ROOF PLAN



CITY OF SIOUX FALLS - LIGHT AND POWER CAMPUS ENHANCEMENTS

0' 16'-0" 32'-0" 64'-0" NORTH

STONE GROUP ARCHITECTS



NORTH ELEVATION



SOUTH ELEVATION



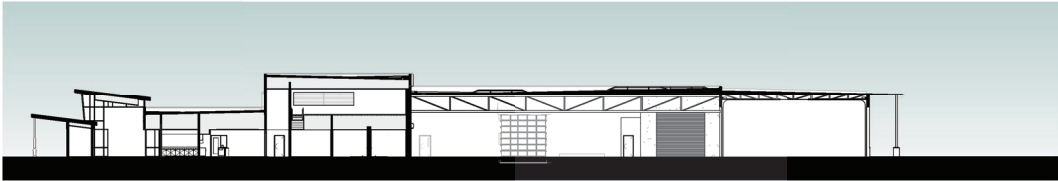
EAST ELEVATION



WEST ELEVATION



BUILDING SECTION



N/S SECTION



EXTERIOR RENDERINGS



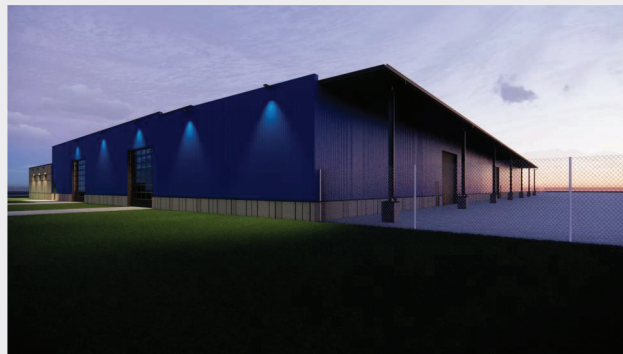
NORTHEAST



NORTHWEST



SOUTHEAST



SOUTHWEST

CITY OF SIOUX FALLS - LIGHT AND POWER CAMPUS ENHANCEMENTS

## INTERIOR RENDERINGS



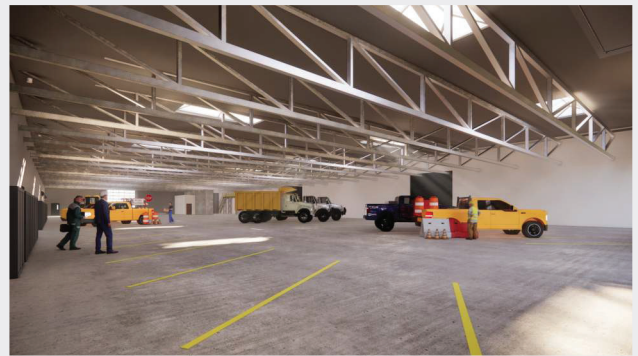
LOBBY



MULTI-PURPOSE ROOM



ARTIFACT HALLWAY



TRUCK BAY

## CITY OF SIOUX FALLS - LIGHT AND POWER CAMPUS ENHANCEMENTS

# ARCHITECTURAL NARRATIVE & PROGRAM

AREA/DEPARTMENT	SPACE	DESCRIPTION	QTY	SF EA.	BLDG SF
GARAGE	TRUCK BAY	35 current trucks, 2 large bucket, one large digger derrick, one dump truck, two large ford 650 sign trucks, 4 small 550 bucket trucks, rest are 444 extended cab trucks. 25 LOCKERS. ANGLED PARKING. 35 CURRENT TRUCKS, 50 FUTURE TRUCKS	1	24,367	24,367
	WASH BAY	Catwalk on both sides	1	1,049	1,049
WORKSHOP	SIGN/PRINT SHOP	test cabinets, programming cabinets, fiber area, switches, clean room; 40' X 60'	1	2,522	2,522
	INVENTORY ROOM	pallet racking for storage materials, tool storage, 3 racks high, smaller items on lower level, loading dock - semis, panel trucks, fe-ex, etc; 12' racking 210', 8' racking 230', 16' racking 152', cabinet storage 34', 9' for finish signs 40'	1	2,633	2,633
	MANAGER OFFICE	work station area for 20 staff lights and 20 staff traffic- each with laptop computer, SCADA, TV map in front of room, TV for meter system, locator stations. Divider wall between light/traffic.	1	111	111
	WORK DEPLOYMENT ROOM (S)	rubber goods storage, safety equipment, meter testing, floor drain, hot and cold water	1	1,658	1,658
	SAFETY TESTING	test cabinets, programming cabinets, fiber area, switches, clean room	1	316	316
	SIGNAL ROOM	SHOWER/CLOTHES LOCKER	1	320	320
	MENS LOCKER ROOM	SHOWER/CLOTHES LOCKER	1	279	279
	WOMENS LOCKER ROOM	SHOWER/CLOTHES LOCKER	1	275	275
	CUSTODIAL / STORAGE ROOM	commercial washer for coats	1	220	220
	LAUNDRY	commercial washer for coats	1	120	120
OFFICE	CHEMICAL STORAGE	drill press, bandsaw, welder, work bench, general tools	1	138	138
	WORKSHOP	SERVER CABINETS	1	832	832
	I.T. ROOM	SERVER CABINETS	1	142	142
	VESTIBULE		2	58	116
	ELECTRICAL SERVICES		1	101	101
	MECHANICAL SERVICES		1	104	104
	WORK	PRINTER, CABINETS	1	63	63
	MULTI-PURPOSE ROOM	commercial stove, range, fridge, ice machine, dishwasher, microwave wall, coffee machine, windows, filtered water	1	953	953
	CONFERENCE ROOM		1	344	344
	FLEX		1	342	342
STORAGE	OFFICE (S)	billing, engineering tech x2, copy/ office supply/ file cabinet room, IT area, breakout room,	4	119	476
	LARGE OFFICE		1	126	126
	MANAGER OFFICE		1	188	188
	OPEN OFFICE SPACE		1	641	641
	VESTIBULE/LOBBY/DISPLAYS		1	356	356
	UNIX RESTROOM		2	66	132
	TEMPERED STORAGE BUILDING	60' X 200'; 40-50 degrees; Traffic cabinets; 16' high pallet racking; 6' tall x 4' wire spools; flat bed deliveries inside (crane 20 tons); Loading dock			12,133
	COVERED STORAGE	15' X 200' lean-to on tempered storage			3,024
	OVERALL				
		CIRCULATION	5.20%	2,110	2,110
	MECHANICAL MEZZANINE	1.00%	2,173	2,173	
	STAIRS		1	200	
				58,564	
	NET SUB-TOTAL			4.27%	
	NET TO GROSS			61,065	
BUILDING OVERALL					

## LIGHT, POWER AND TRAFFIC DEPARTMENT

As the city grows the workload that is required from the Light, Power and Traffic department is also increasing. This department has 28 full time and part time employees, which includes office staff, shop workers and field technicians. The number of employees will increase, and the department strives to have a collaborative space to retain the current and future employees. Looking towards the future, the goal is to consolidate what is currently in different buildings, and bring everything to one location. Based on this projected growth and collaboration, the department will need multiple type of spaces. These include a large garage for maintenance vehicles, locker rooms and restrooms to accommodate all employees, work deployment rooms, conference rooms, large kitchen and break room, fitness room, and a myriad of workshops and storage rooms for the department.

The adjacent chart visibly shows the programming needs of the department through a table. The table shows the overall "AREA" in which each space will lie, these include the garage, workshop and office spaces. The "SPACE" and "DESCRIPTION" column gives a more in-depth name and description as to what is currently being utilized and what the department actually would like to have within this space. The next columns include square footage of these spaces. This table is necessary to portray a itemized list of spaces that can be viewed and refined by the department.

## PROGRAMMING

The program chart shows the needs of the department when it comes to combining the whole team into a singular building. The garage space includes a truck bay that can accommodate 26 small and ten large maintenance vehicles, and also includes a wash bay. The workshop area includes a sign/print shop which is where the traffic department makes their signs. The inventory room has large pallet storage for materials, a small overhead loading door, as well as a manager office. The work deployment room(s) are spaces where the field workers can work from, and also have training. These rooms are large enough for 20 workers to have their individual spaces. There are a few auxiliary rooms such as the signal room and the safety testing room, that provide supplementary support to the department. The workshop is provided to have a space for the staff to perform maintenance or create what they may need for their job. Locker rooms, as well as large lockers, provide spaces for staff to store their personal items and field gear.

The office area of the building includes 6 private offices for supervisors and engineers, as well as space for 11 staff cubicles and one cubicle for supplies/printer/work area. Directly inside of the entrance and vestibule, there is a conference room. A fitness room is also within this area, and can be utilized by both the office and field staff. The multipurpose room is located at the center of the building, and has a kitchen and many tables for employees to use as a break room. Some supplementary rooms within the office area include mechanical, electrical and information technology rooms, restrooms.

## DESIGN FEATURES

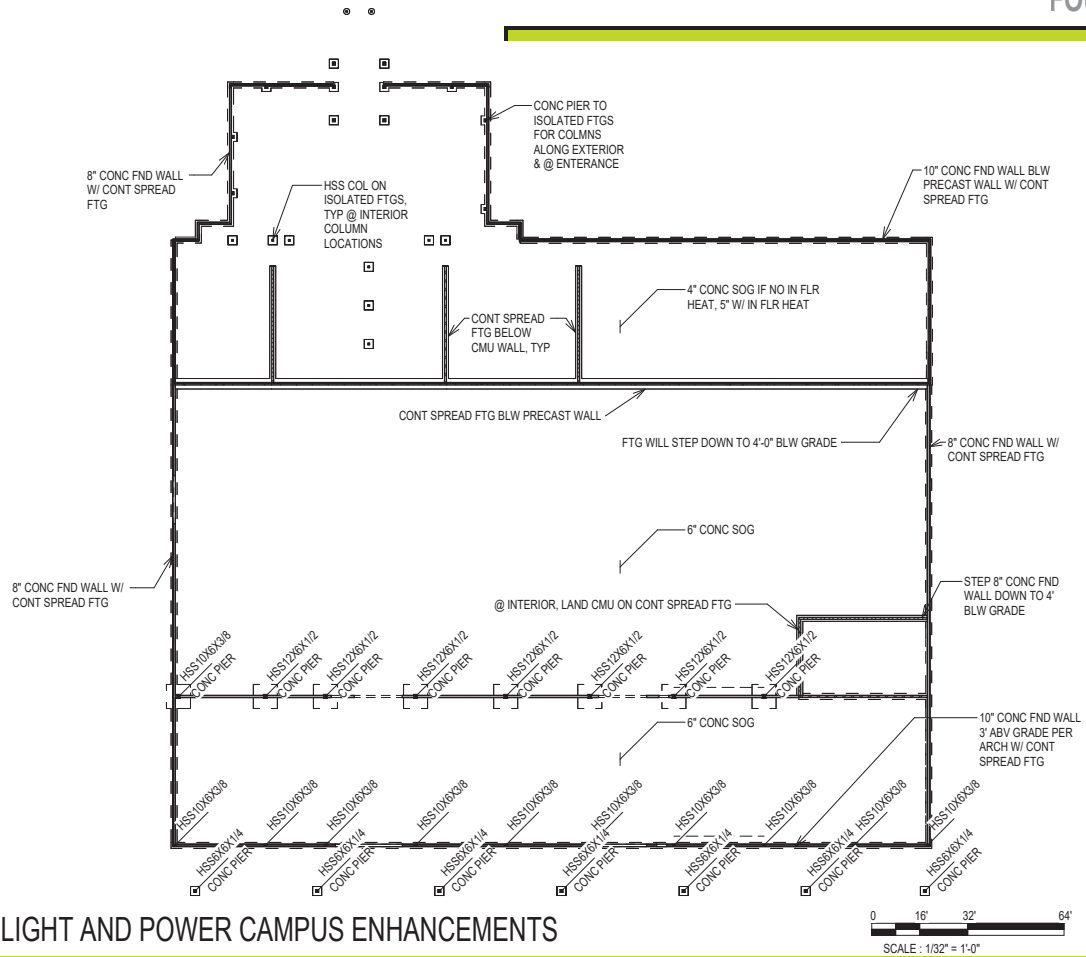
The light and power departments currently have a significant amount of historical artifacts. It is intended to display some of these artifacts within the new facility. Areas for display of these artifacts are anticipated in the entrance lobby as well as along the corridor wall opposite the multipurpose room. The lobby is provided with spacious glass and the corridor in front of the multipurpose rooms is provided with second story clerestory windows for natural lighting of these displays.

Natural daylighting is brought into the interior conference room via a glass front wall facing the lobby to utilize borrowed light from the entrance lobby. The multipurpose room also has floor to ceiling glass along the corridor to not only provide views of the artifact display wall, but also to bring in natural daylight from the second story clerestory windows in the corridor.

The design incorporates several elements for future expansion. The building is sited and designed to allow for approximately 100' of future expansion of the workshop spaces, parking, and inside/outside storage areas to the west. The walls and ceiling heights of the inventory room are identical to allow the the expansion of either of these room into the other. Future additional offices could be accommodated within the space occupied by the multipurpose room. This would allow the office areas to remain consolidated in one area and a new multipurpose room could be added as part of a workshop area expansion

# CITY OF SIOUX FALLS - LIGHT AND POWER CAMPUS ENHANCEMENTS

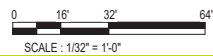
# FOUNDATION PLAN



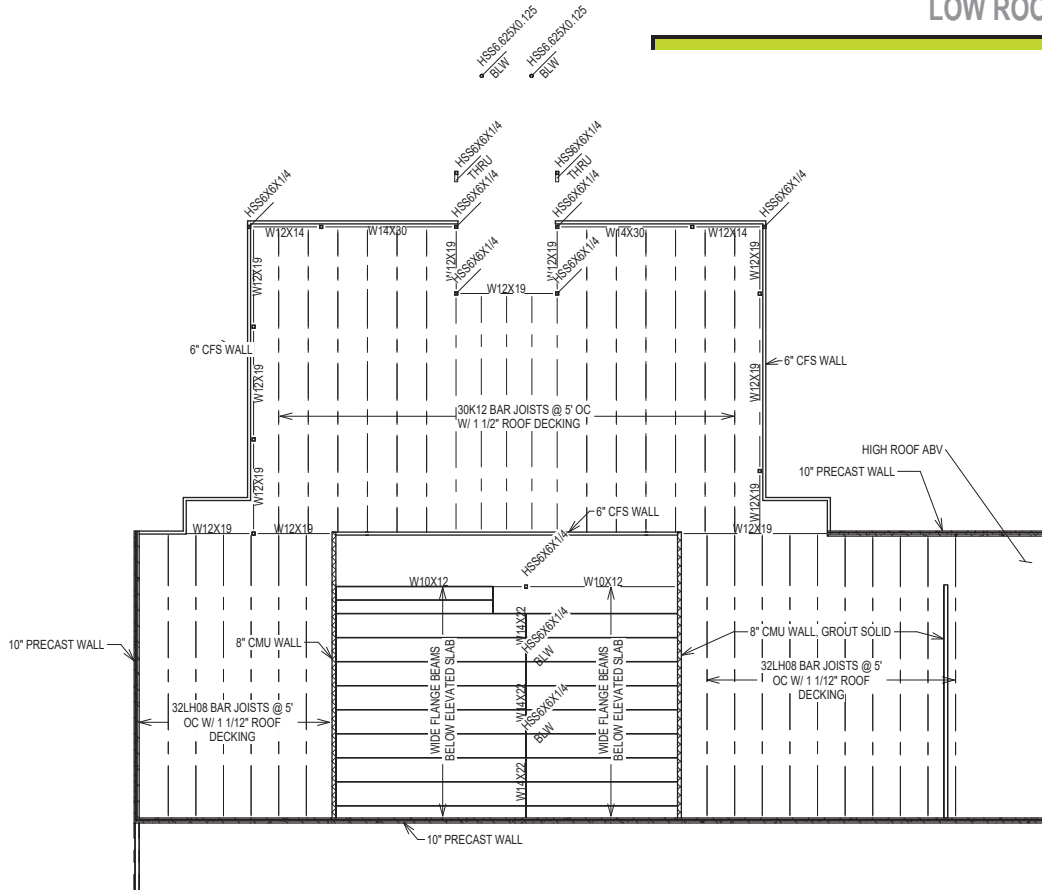
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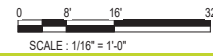
CITY OF SIOUX FALLS LIGHT AND POWER CAMPUS ENHANCEMENTS



# LOW ROOF & MEZZANINE FRAMING PLAN



CITY OF SIOUX FALLS LIGHT AND POWER CAMPUS ENHANCEMENTS



  
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**STONE GROUP**  
 ARCHITECTS





## STRUCTURAL NARRATIVE

### Design Criteria:

- a. The Sioux Falls Light, Power, and Traffic Building is being designed structurally in accordance with the 2021 International Building Code.
- b. The following loads will be used in the design of the SF LPT building. Facility is considered a Risk Category IV building per ASCE 7 due to being considered an essential facility:
  - a. Snow Loads
 

1. Ground snow load:	40 psf
2. Typical flat roof snow load:	34 psf uniform + drift
3. Additional solar panel drift:	30 psf
4. Snow importance factor:	1.2
  - b. Dead Loads:
 

1. Interior Floors:	20 psf + self weight
2. Roof:	20 psf + self weight
3. Solar (cold storage roof only):	5 psf
  - c. Wind Loads:
 

1. Velocity (ultimate):	125 mph
2. Velocity (service):	97 mph
3. Exposure:	C
4. Internal Pressure Coefficient:	± 0.18
- d. Other: Mechanical units to be included in the mezzanine floor loading will be designed for their specific weight as that information is provided.

### Foundations and Slab-on-Grade

- a. The building foundations are expected to be conventional spread footings with engineered fill as required per geotechnical recommendations. All foundation walls below precast walls will extend to 1'-0" below grade where a connection to precast will be provided. All foundation walls below CFS walls will extend up to grade or higher based on architectural preference.
- b. In all office/workshop locations that will not accommodate heavy machinery, a 4" concrete slab on grade will be used. If in floor heat is desired, a 5" concrete slab on grade shall be used.
- c. In all locations where heavy machinery will be used, a 6" concrete slab on grade will be suggested as a placeholder until further information is provided.

### Exterior and Interior Wall Construction

- a. The majority of load bearing walls are to be 10" thick load bearing insulated precast wall panels. Precast walls will be a composite insulated panel with a structural concrete wythe, an insulation wythe, and another structural concrete wythe. Any portion of the exterior walls not needed for structural purposes will likely be framed with cold-formed studs and exterior rated gypsum sheathing.
- b. Some load bearing walls will be constructed from 8" CMU walls. It is expected that these walls will have to be grouted solid.
- c. The precast walls on the west side of the structure will be able to be lifted away from the foundation wall in the event of future expansion for the building.

### Floor Framing

- a. Floor framing will only be required for the mechanical room mezzanine floor. A composite elevated slab with steel beam system will be used for the floor system. Coordination with mechanical will be required to size the beams.
- b. Coordination of embeds in precast walls will be critical for the beams supporting mezzanine floor.

### Roof Framing

- a. Roof framing is anticipated to consist of steel bar joists or steel wide flange beams supporting either 1 1/2" metal decking for 5' spacing or 3" metal decking for 10' spacing.

### Lateral Force Resisting System

- a. All exterior/interior precast walls will be used as shear walls to resist lateral loading. CMU bearing walls will also be used as shear walls. In areas without precast or CMU walls present, steel braced frames will be required to resist lateral loading. The metal roof deck will act as a diaphragm to transfer lateral loads to precast/CMU walls or steel braced frames.

### Materials

- a. Cast-in-place concrete (28 day compressive strength, f'c):
 

1. Footings:	3500 psi
2. Foundation walls:	4500 psi
3. Interior slabs on grade:	4000 psi
4. Non-shrink grout:	7000 psi
- b. Reinforcing Steel
 

1. Standard deformed bar:	ASTM A615, Grade 60
2. Weldable deformed bar:	ASTM A706, Grade 60
- c. Structural steel:
 

1. Wide flange shapes:	ASTM A992
2. Rectangular HSS:	ASTM A500 Grade B or C
3. Miscellaneous shapes, plates, or angles:	ASTM A36

## STRUCTURAL NARRATIVE

- a. Steel connection material:
  - 1. Conventional 3/4" dia. structural bolts: ASTM F3125, Grade A325
  - 2. Anchor rods:  
supplement: ASTM F1554, Grade 36 or 55 w/ S1 weldability
  - 3. Hardened washers: ASTM F436
  - 4. Nuts: ASTM A563
  - 5. Welding electrodes: E70XX
- b. Metal decking:
  - 1. Roof decking: ASTM A653, Grade 50
- c. Precast concrete:
  - 1. Structural and face wythes, f'c: 5000 psi minimum
  - 2. Wythe connectors: Non-conductive composite connectors

### Deflection Limits

- a. Roof framing members:
  - a. Snow or live load: L/360
  - b. Total load: L/180
- b. Walls, out of plane at service wind load: L/240
- c. Lintels, in plane: L/600

### Special Inspections

- a. Structures designed in accordance with IBC 2021 are required to have "special inspections" performed during the construction of the project. "Special inspections" are quality control inspections and testing that is performed on a periodic basis to ensure the adequacy of construction. Such inspection services are required to be paid for directly by the Owner and not by the contractor.

### Information required to complete design

- a. Geotechnical report for the site.
- b. Mechanical unit information for the mechanical housing mezzanine.

## MECHANICAL & PLUMBING NARRATIVE

### PROJECT OVERVIEW

The project consists of a new office, workshop, sign printing and inventory space for the City of Sioux Falls Light, Power and Traffic Divisions. The overall building space is approximately 40,000 square feet. The project also included a cold storage building of approximately 12,000 sq. ft.

### MECHANICAL EXECUTIVE SUMMARY

#### Heating and Cooling

- Office Spaces:
- The heating, cooling, and ventilation (HVAC) systems serving the office areas, conference rooms, multipurpose room, deployment rooms, fitness area, lockers and testing areas will be designed as a two-pipe geothermal heat pump system with individual fan coil heat pumps in each space.
- Ventilation air for these spaces will be provided by an energy recovery unit that will also provide exhaust for the bathroom, multipurpose room, fitness area and lockers.
- Sign/Print Shop:
  - This space will be conditioned by an energy recovery unit dedicated to this space. This unit will maintain the critical space temperature and humidity level needed for the work that will be completed in this space.
- Truck Bay Areas:
  - The truck bay areas will be served by in floor radiant heat system with hot water produced by electric boilers. Electric unit heaters will also be provided in the maintenance spaces for faster temperature response.
  - The code required exhaust and ventilation air for the maintenance area will be provided by an energy recovery ventilator with electric heat.

#### Mechanical Services

- New domestic water, sanitary waste and fire sprinkler services will be required. The location of the new domestic water, fire sprinkler, and sanitary sewer services will be coordinated with the final building floorplan.

#### Codes and Standards

- Code requirements shall be the minimum standard of care for the design of the HVAC system of this facility. Good engineering practices, and nationally recognized design guidelines shall also serve as the basis of design.
- Plumbing piping shall be installed as per the code of the State of South Dakota.
- High-Performance Building Standards as provided by the City of Sioux Falls will be followed.

#### LEED

- This project will not seek LEED Certification.

### FIRE PROTECTION SYSTEMS

#### Service and System

- A new fire protection service, anticipated to be 4", will enter the facility in the first floor Mechanical Services room. The new system and all components will be installed to meet NFPA 13 standards and will serve the entire building. A fire pump is not anticipated to be needed.

### PLUMBING SYSTEMS

#### Services and Systems

- New domestic water piping will be installed and distributed appropriately throughout the facility. It is anticipated that the domestic water service will be 2". The domestic water service will be brought into the first floor Mechanical Services room, parallel to the fire protection service. A booster pump system will not be required.
- New sanitary sewer piping will be installed and distributed appropriately throughout the facility. It is anticipated that the sanitary sewer service will be 4".

#### Fixtures

- Low flow plumbing fixtures will be utilized throughout the facility to reduce water consumption, as well as reduce the amount of waste. No automatic type fixtures will be utilized in the building.
- Water closets will be floor mount, manual flush valve type.
- Urinals will be manual flush valve type.
- All lavatories will be countertop mounted with manual 0.5 GPM single handle faucets.
- Showers will have 1.5 GPM shower heads.
- Kitchen sinks in the kitchenette will be double compartment sinks with gooseneck style faucet.
- The kitchenette will include plumbing connections for a dishwasher and garbage disposal.
- The Custodial room will include a mop sink.
- Floor drains will be provided in each restroom, janitor's closet, and mechanical spaces. Deep seal traps will be used at all floor drains in infrequently used areas, to help keep the trap primed.

#### Domestic Water System

- Domestic hot water will be provided via an electric water heater located in the Mechanical Services room. The required size of the water heater will be found after the floorplan for the building is finalized. The water heater will also include an appropriate sized expansion tank, recirculating hot water pump, aquastat and timer.
- The domestic hot water will be circulated via a circulation pump and a hot water recirculation piping loop throughout the facility as per code requirements.
- A water softener will be provided in the Mechanical Services room to soften all the cold water only that will be used by the fixtures in the building.
- The Truck Bay area will have cold water hose bibs along the east and west sides of the bay area two cold water hose bibs on the middle of the walls of the wash bay.
- The owner will provide an electric hot water pressure washer and will use the cold water hose bibs throughout the building. There will be no mechanical work for the hot water pressure washer.
- Multiple freeze proof exterior wall hydrants will be provided on the exterior of the building.

## MECHANICAL & PLUMBING NARRATIVE

### Piping

1. Piping materials shall be as follows:  
SANITARY SEWER AND VENT PIPING, BURIED INSIDE OR WITHIN 5 FEET OF BUILDING
- A. The following piping systems shall be allowed where permitted by Local Code:
- B. ABS Pipe: ASTM D2661.
  1. Fittings: ABS.
  2. Joints: Solvent welded with ASTM D2235 cement.
- C. PVC Pipe: ASTM D2665 or ASTM D3034.
  1. Fittings: PVC.
  2. Joints: Solvent welded, with ASTM D2564 solvent cement.
- SANITARY SEWER AND VENT PIPING, ABOVE GRADE
- A. PLASTIC PIPING IS NOT PERMISSIBLE IN RETURN AIR PLENUM LOCATIONS.
- B. Cast Iron Pipe: ASTM A74, service weight.
  1. Pipe to be coated inside and out.
  2. Piping 2" and larger.
  3. Fittings: Cast iron.
  4. Joints: Hub-and-spigot.
  5. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
- C. Cast Iron Pipe: CISPI 301, hubless, service weight.
  1. Coated inside and out.
  2. Piping 2" and larger.
  3. Fittings: Cast iron.
  4. Joints: CISPI 310, neoprene gaskets and stainless-steel clamp-and-shield assemblies.
- D. Copper Tube: 2 (1), Type L (B).
  1. Allowed only on pipe sizes 1-1/2" and smaller.
  2. Fittings: ASME B16.23, cast bronze, or ASME B16.29, wrought copper.
  3. Joints: ASTM B 32, alloy Sn95 solder.
- E. PVC Pipe: ASTM D2665 or ASTM D3034.
  1. Fittings: PVC.
  2. Joints: Solvent welded, with ASTM D2564 solvent cement.
- WATER PIPING, BURIED INSIDE, OR, WITHIN 5 FEET OF BUILDING
- A. JOINTS WILL NOT BE ALLOWED UNDER FLOOR.
- B. Piping 3" in size and larger shall be ductile-iron, piping 2" and smaller shall be Type "K" soft drawn copper water tube.
- C. Copper Pipe: ASTM B 88, Type K soft tempered.
  1. Fittings: ASME B16.26, cast bronze, or ASME B16.22, wrought copper and bronze.
  2. Joints: Flared.
- D. Ductile Iron Pipe: AWWA C151/A21.51.
  1. Fittings: Ductile or gray iron, standard thickness.
  2. Joints: AWWA C111/A21.11, rubber gasket with 3/4 inch diameter rods.
- E. Ductile Iron Pipe: AWWA C151/A21.51.
  1. Fittings: Ductile or gray iron, standard thickness.
  2. Joints: AWWA C111/A21.11, rubber gasket with 3/4 inch diameter rods.

### DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B 88 (ASTM B 88M), Type L (B), Drawn (H).
  1. Fittings: ASME B16.22, wrought copper and bronze.
  2. Joints: ASTM B 32, alloy Sn95 solder.
  3. Except as otherwise specified elsewhere, Type "L" soft drawn copper may be used adjacent to fixtures and equipment.
  4. Grooved Joints: Bolted clamp type coupling with grooved end lock, ASTM A-536. Victaulic or approved equivalent.
  5. Grooved Fittings: Cast bronze, grooved ends, ASTM B-584-87, or wrought copper, grooved ends ASTM B-75. Victaulic or approved equivalent.

### Piping Insulation

1. Piping materials shall be as follows:  
GLASS FIBER
- A. Manufacturers:
  1. Knauf Insulation: [www.knaufusa.com](http://www.knaufusa.com).
  2. Owens Corning Corporation: [www.ocbuildingspec.com/sle](http://www.ocbuildingspec.com/sle).
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
  1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
  2. Maximum Service Temperature: 850 degrees F.
  3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
  1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
  2. Maximum Service Temperature: 650 degrees F.
  3. Maximum Moisture Absorption: 0.2 percent by volume.
- D. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- E. Vapor Barrier Lap Adhesive: Compatible with insulation.
- F. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
  1. Manufacturers:
- G. Fibrous Glass Fabric:
  1. Blanket: 1.0 lb/cu ft density.
- H. Indoor Vapor Barrier Finish:
  1. Cloth: Untreated; 9 oz/sq yd weight.
  2. Vinyl emulsion type acrylic, compatible with insulation, black color.

## MECHANICAL & PLUMBING NARRATIVE

### JACKETS

#### PVC Plastic.

1. Manufacturers:
  - a. Johns Manville Corporation: [www.jm.com](http://www.jm.com).
  - b. Speed-Line .
2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
  - a. Minimum Service Temperature: 0 degrees F.
  - b. Maximum Service Temperature: 150 degrees F.
  - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
  - d. Thickness: 15 mil.
  - e. Connections: Brush on welding adhesive.

### SCHEDULES

#### Plumbing Systems:

1. Domestic Hot Water Supply and Hot Water Recirculation:
  - a. Glass Fiber Insulation:
    - 1) Pipe Size Range: thru 1-1/2 inch.
      - (a) Thickness: 1-1/2 inch.
    - 2) Pipe Size Range: 2 inch and greater
      - (a) Thickness: 2 inch.
2. Domestic Cold Water:
  - a. Glass Fiber Insulation:
    - 1) Pipe Size Range: greater than 1/2 inch.
      - (a) Thickness: 1 inch.
3. Plumbing Vents Within 5 Feet of the Exterior:
  - a. Glass Fiber Insulation:
    - 1) Pipe Size Range: All sizes.
      - (a) Thickness: 1 inch.
- B. Any location that the plumbing piping insulation is exposed provide PVC jacket.

### HVAC SYSTEMS

#### Design Criteria

1. Design conditions shall be based on ASHRAE Fundamentals Handbook for Sioux Falls, SD at frequency levels of 0.4% for summer dry-bulb and mean coincident wet bulb temperature and 99.6% for winter dry bulb temperature.  
Outside Design Conditions:  
Location: Sioux Falls, SD  
Summer: 95°F db / 73.2°F wb  
Winter: -20°F

#### Ventilation Systems

1. The office, conference rooms, multipurpose room, fitness area, and work spaces will be heated and cooled by horizontal two pipe geothermal heat pumps that will be concealed above the ceiling.
2. The sign/print area will be tempered/conditioned by a dedicated energy recover unit that will provide ventilation and exhaust for the space. It will also be equipped with hot-gas reheat to allow dehumidification of the space as needed.
3. The truck bay area will be heated only and will be heated with in-floor radiant heat that is supplied by electric boilers. To help with a quicker temperature response, multiple electric unit heaters will be provided.
4. To provide the code required exhaust for the truck bay areas, an energy recovery ventilator will be provided that will run continuously during occupied hours by interlocking it with the lights. A humidistat will also be provided in the space. The humidistat will turn on the energy recovery ventilator if the space is unoccupied if the space humidity rises too high and will turn off when the humidity levels fall.
5. The bathroom and the custodial areas will be provided by individual ceiling mounted exhaust fans.
6. The SCADA room will be heated and cooled by horizontal two pipe geothermal heat pumps that will be concealed above the ceiling.

#### Geothermal Systems

1. The geothermal system will include a number of vertical wells which will be about 200 feet deep. The exact number of wells will depend on the well conductivity test that will need to be contracted by the owner.
2. Each of the geothermal wells will run back to a geothermal vault that will connect to a header inside the vault. The supply and return piping mains will run from the vault to the building.

## MECHANICAL & PLUMBING NARRATIVE

### Ductwork

1. Building Ductwork: rectangular supply ductwork is to be lined, round ductwork is to be wrapped, and all rectangular return ductwork is to be lined. All bathroom exhaust is to be wrapped from the vertical drop to 10 feet from the drop. All ductwork that is exposed to the outdoors will be both lined and wrapped with board insulation.

2. Ductwork materials and construction shall be as follows.

#### MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Stainless Steel for Ducts: ASTM A666, Type 304.
- C. Aluminum for Ducts: ASTM B209 (ASTM B209M); aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.
- D. Insulated Flexible Ducts:
  1. Black polymer film supported by helically wound spring steel wire; 1" fiberglass insulation; polyethylene or aluminized vapor barrier film. Duct sizes on plans are inside dimensions
    - a. Pressure Rating: 4 inches WG positive and 0.5 inches WG negative.
    - b. Maximum Velocity: 4000 fpm.
    - c. Temperature Range: -20 degrees F to 175 degrees F.
  2. UL 181; 1 inch thick rigid glass fiber with aluminum foil, glass scrim and kraft vapor barrier; maximum 0.23 K value at 75 degrees F.
- E. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
  1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
- F. Hanger Rod: ASTM A 36/A 36M; steel; threaded both ends, threaded one end, or continuously threaded.

#### MANUFACTURED DUCTWORK AND FITTINGS

- A. Manufacture in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
  1. Low velocity sheet metal ductwork shall be designed for a duct pressure class of 2" W.G. This includes all ducts serving supply, return, relief and exhaust air systems, unless otherwise specified elsewhere in this section or on the Drawings.
- B. Spiral Round and Flat Oval Ducts:
  1. Manufacture in accordance with SMACNA (DCS).
  2. Fittings: Manufacture at least two gages heavier metal than duct.
  3. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

### C. Longitudinal Seam Round and Flat Oval Ducts:

1. Machine made from round spiral lockseam duct with light reinforcing corrugations. Fittings shall be manufactured of at least two gages heavier metal than the duct or heavier as required by the manufacturer.
2. Spiral ductwork, including fittings, shall be joined by one of the following methods:
  - a. Welded or "Van Stone" flange construction, angle ring bolted - flange connection.
  - b. Lightweight flanged connection using "Marman" coupling.
  - c. United "Flex-Lock" Coupling.
  - d. Slip joint with fitting collar, "United" duct sealer or approved equal, and "United" tape or approved equal applied in strict accordance with manufacturer's recommendations (Not allowed in exposed areas)
  - e. Ductmate Spiralmate or Ovalmate duct connector system.
  - f. Thermofit Bands,

#### SCHEDULES

- A. Ductwork Material:
  1. Low Pressure Supply: Steel .
  2. Return and Relief: Steel
  3. General Exhaust: Steel
  4. Outside Air Intake: Steel.

#### Ductwork Insulation

1. Ductwork insulation shall be as follows:  
GLASS FIBER, FLEXIBLE

  - A. Insulation: ASTM C553; flexible, noncombustible blanket.
    1. 'K' value: 0.36 at 75 degrees F, when tested in accordance with ASTM C 177.
    2. Maximum Water Vapor Absorption: 5.0 percent by weight.
  - B. Vapor Barrier Jacket:
    1. Kraft paper with glass fiber yarn and bonded to aluminized film.
    2. Secure with pressure sensitive tape.
  - C. Vapor Barrier Tape:
    1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
  - D. Outdoor Vapor Barrier Mastic:
    1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

## MECHANICAL & PLUMBING NARRATIVE

### DUCT LINER

A. Insulation: ASTM C 1071; flexible, noncombustible blanket with poly vinyl acetate polymer or acrylic polymer shown to be fungus and bacteria resistant by testing to ASTM G 21 impregnated surface and edge coat.

1. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
2. Service Temperature: Up to 250 degrees F.
3. Maximum Velocity on Coated Air Side: 5,000 fpm.
4. 1.5 pound per cubic foot density.
5. Fire resistant skin surface.

B. Liner Fasteners: Galvanized steel, self-adhesive pad or impact applied with integral head.

### SCHEDULES

- A. Exhaust Ducts Within 10 ft of Exterior Openings:
1. Flexible Glass Fiber Duct Insulation: 1-1/2 inches thick.
- B. Outside Air Intake Ducts:
1. Rigid Glass Fiber Duct Insulation: 1-1/2 inches thick.
- C. Supply and Return Ducts (rectangular):
1. Glass Fiber Duct Liner Insulation: 1 inches thick.
- D. Supply and Return Ducts Exposed to the exterior:
1. Glass Fiber Duct Liner Insulation: 1 inches thick.
  2. Rigid Glass Fiber Duct Insulation: 2 inches thick
- E. Supply Ducts (round):
1. Flexible Glass Fiber Duct Insulation: 1 inches thick.

### HVAC Piping

1. HVAC piping materials shall be as follows:

#### GEOTHERMAL WATER AND HEATING WATER PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A 106 Grade B, Schedule 40, black, using one of the following joint types:
1. Welded Joints: ANSI B 16.9, ASTM A 234/A 234M, wrought steel welding type fittings; AWS D1.1 buttwelded.
    - a. Sizes 2-1/2" and larger.
  2. Threaded Joints: ASTM B 16.3, malleable iron fittings. 175 lb (WOG).
    - a. Sizes up to and including 2".
  3. Unions: 2" and smaller to be malleable iron ground joint with brass seat, 500 lb. (WOG).
  4. Flanges: 2-1/2" and larger to be forged steel welding neck or slipon, 150 psig, ANSI B 16.5.
  5. Grooved Fittings: ASTM A536 ductile iron or ASTM A53 factory fabricated steel, grooved type.
  6. Mechanical Grooved Couplings: Cast ductile iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
- B. Copper Tube: ASTM B 88 (ASTM B 88M), Type L (B), hard drawn, using one of the following joint types:
1. Solder Joints: ASME B16.22 solder wrought copper fittings.
- a. Solder: ASTM B 32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.

### HVAC Piping Insulation

1. HVAC piping insulation shall be as follows:

#### GLASS FIBER

- A. Manufacturers:
1. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
  2. Johns Manville Corporation: [www.jm.com](http://www.jm.com).
  3. Knauf Insulation: [www.knaufinsulation.com](http://www.knaufinsulation.com).
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
  2. Maximum Service Temperature: 850 degrees F.
  3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
  2. Maximum Service Temperature: 650 degrees F.
  3. Maximum Moisture Absorption: 0.2 percent by volume.
- D. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- E. Nu-Fibre TekPipe 1000 deg F insulation may be used as an alternative to glass fiber insulation.
- F. Vapor Barrier Lap Adhesive: Compatible with insulation.
- G. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
- H. Fibrous Glass Fabric:
1. Blanket: 1.0 lb/cu ft density.
- I. Indoor Vapor Barrier Finish:
1. Cloth: Untreated; 9 oz/sq yd weight.
  2. Vinyl emulsion type acrylic, compatible with insulation, black color.

#### JACKETS

- A. PVC Plastic.
1. Manufacturers:
    - a. Johns Manville Corporation: [www.jm.com](http://www.jm.com).
  2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
    - a. Minimum Service Temperature: 0 degrees F.
    - b. Maximum Service Temperature: 150 degrees F.
    - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
    - d. Thickness: 15 mil.
    - e. Connections: Brush on welding adhesive.

#### SCHEDULE

- A. Geothermal Water and Heating Water Systems:
1. Geothermal Water and Heating Water Supply and Return:
    - a. Glass Fiber Insulation:
      - 1) Pipe Size Range: thru 1-1/2 inch.
      - 2) Thickness: 1-1/2 inch.
      - 3) Pipe Size Range: 2 inch and greater
      - 4) Thickness: 2 inch.



## MECHANICAL & PLUMBING NARRATIVE

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### **Building Automation / Temperature Control System:**

1. The building heating, cooling, and ventilation systems communicate and will be controlled thru a direct-digital controls system. This system allows the building operator to see the building space temperatures, equipment operation, and system alarms thru system graphics and programming installed in building system controller and accessible thru the building network connection by the operator's workstation computer. This system allows the building operator to make changes as needed to the building heating/cooling systems to maintain space temperatures within the building.

### **Mechanical/Electrical Equipment Connections**

1. Coordinate/provide all mechanical equipment with electrical connections with the Electrical Contractor, including equipment electrical disconnects, motor overloads, etc., for all mechanical equipment.

## ELECTRICAL NARRATIVE

### Electrical

#### Overview of Scope of Work

1. A new electrical service will be brought to the facility. The incoming voltage is anticipated to be a 480v, 3 phase, service utilizing step down transformers to 120/208v panelboards in the building. It is planned to use Integrated Power Centers (IPC) which house 277/480V, stepdown transformers, and 120/208V panelboards in the same enclosure to minimize space needs. The electrical service to the building will be by City of Sioux Falls Light Department. The transformer primary service is anticipated to come from Sycamore Avenue so the transformer will be coordinated and installed on the west side of the building.
  2. Electrical meters shall be provided as follows:
  3. One meter for the main, single electric service
- All meters shall be utility grade, provided by the owner/owner's utility rural electric cooperative.
3. An emergency generator shall be provided. The size is to be determined however, it is anticipated to provide for only a portion of the building to be backed up .
  4. New lighting shall be LED. Automatic lighting controls shall be provided per code.
  5. No EV vehicle charging stations are currently planned at this time, but a conduit will be stubbed out to the north of the building for a future installation.

#### Codes and Standards

1. Code requirements shall be the minimum standard of care for the design of the electrical system of this facility. Good engineering practices, and nationally recognized design guidelines shall also serve as the basis of design.
2. The electrical systems shall be installed as per the National Electrical Code (NEC / NFPA 70) and the State of South Dakota codified electrical codes.

#### Energy Efficiency

1. This project will be designed in accordance with applicable energy codes and will incorporate as much of the new Sioux Falls High Performance Building Standard as the budget will allow.

### BUILDING ELECTRICAL SYSTEMS

#### Normal Electrical Distribution

1. A utility transformer will be located on the project site. The specific location will be coordinated with local utility and the design team. It is anticipated the utility transformer will be pad-mounted. A pad-mounted transformer will want to be located within 10-feet of a hard surface such as a parking lot or driveway for the utility to access and maintain. Clearances shall be maintained around the utility transformer. A CT/transition cabinet may be required, pending the size of the electric service.
2. A new electrical service will be brought to the facility. The incoming voltage will be 480-volt, 3-phase. It is anticipated the heat source for the building will be primarily electric heat. The heat load, lighting load, receptacle load, and equipment loads will be calculated during the design process. The main electrical service entrance equipment will be located in the electrical services room.
3. Lighting and appliance panelboards shall be located in various locations throughout the building, as deemed appropriate for the use of the spaces. Currently Integrated Power Centers (IPC) are anticipated in: electrical service, workshop, sign room, and the truck bay
4. Large mechanical and electrical loads will be served directly from the main distribution panel/switchboard.
5. Spare capacity will be provided in the electrical equipment to allow for future expansion of the office and truck bay areas.

#### Grounding System

1. Grounding system will be installed to meet the National Electrical Code.

#### Emergency System

1. A new emergency generator will be provided for the facility. At this time, it is anticipated the generator will only back up a portion of the building. However, the size and actual loads on the emergency generator will be determined and coordinated with the Owner during the design. The generator will be diesel powered. Currently it is planned that the generator will power the overhead garage doors, some computer outlets and the war room.
2. The generator will be in a reach-in (not walk-in) sound attenuated lockable enclosure installed outdoors behind the facility.
3. An Automatic transfer switch will be provided to transition between normal utility power and emergency generator power. A single transfer switch is anticipated. The transfer switch will be closed-transition style (i.e. make before break).
4. Emergency lighting will be required in this facility, to include internally illuminated exit lights and emergency egress lighting both within and exterior to the building. It is anticipated that all light fixtures required for emergency and emergency egress will have a battery source (either internal or external).

## ELECTRICAL NARRATIVE

### Building Electrical Systems (General)

1. Equipment Sizing Criteria and Calculations - Equipment will be sized according to NEC calculation requirements. All new equipment will be sized with 10% spares and 20% space to allow for future growth.
2. Conduit and Raceway - EMT conduit will be used throughout the project for homeruns. There will be no PVC electrical conduit installed inside the building. Flexible metal conduit will be used for wiring light fixtures and motors.
3. Wire - All wire and cable will be Type THHN/THWN, copper, 600-Volt rated, minimum size #12 for all power wiring. Control wiring will be Type THHN/THWN, copper, 600-Volt rated, minimum size #14.
4. Boxes - Outlet boxes will be minimum 4-inch, square or octagonal. Surface boxes will be cast-type. Concealed or flush boxes for interior building use will be stamped, galvanized. Boxes for exterior use will be cast type. Pull and junction boxes will be sized per NEC and will be either galvanized or steel with painted enamel finish.
5. Wiring Devices - Switches and receptacles will be specification grade, full tumble plastic body, gray in color, with stainless steel cover plates. Outlets will be AFCI/GFCI as required by the National Electrical Code.
6. In the Lights work/deployment room and the Traffic work/deployment room, each table will require power for staff to review workorders, etc. These rooms will also have multiple (4-6) monitors to function as a war room in case of emergencies.
7. Sign print room will require a connection to the sign printer. Electrical requirements for this connection will be coordinated with the Owner.
8. The safety training room is used mostly for electrical safety gear storage and as such minimal power requirements are anticipated.
9. The signal room is used for programming of traffic cabinets and will require outlets around the room and over a testing bench that is anticipated in the room.
10. In the truck bay, heaters will be installed by the overhead doors (either electric or hydronic heaters) and electrical connections are anticipated.
11. In the wash bay, it is anticipated that there is a water heater installed for the pressure washers to clean the vehicles along with the connections as needed for the pressure washers.

### Data/Cabling Systems

1. General items
  - a. A new voice / data distribution system will be installed in the building. A location in the IT room will be identified for the serving telecommunications utilities to location their demarcations. Raceways will be installed from this room and routed underground to the property line for the serving telecom utilities to pull their cabling into the building.
2. Distribution frames
  - a. Main /intermediate distribution frames (MDF/IDF) will be in the IT room as outlined in the scope of work provided to the design team at the start of the project.

1. Cross-Connection Equipment:
  - a. Connector Blocks for Category 6, Type 110 insulation displacement connectors
  - b. Printed circuit board interface, capacity sufficient for cables to be terminated plus 25 percent spare.
  - c. Patch Panels for Copper Cabling sized to fit EIA standard 19-inch-wide equipment racks; 0.09-inch-thick aluminum.
2. Copper Horizontal Cable: Cabling to Outlets
  - a. TIA/EIA-568 Category 6 solid conductor unshielded twisted pair (UTP), 23 AWG, 94 ohms
  - b. 4 individually twisted pairs; covered with blue overall jacket for data and voice and complying with all relevant parts of and addenda to latest edition of TIA/EIA-568 and UL 444.
  - c. Horizontal cabling shall not exceed 300' from rack to outlet.
  - d. Only Panduit certified CAT 6 and 6A solutions will be accepted utilizing Panduit TX6A and TX6 cabling.
  - e. Wiring to desktops will utilize CAT 6 cabling while wireless access points (WAP) will utilize CAT 6A cabling.
3. In plenum spaces, provide NFPA 70 type CMP plenum-rated cable.
4. Devices:
  - a. Jacks and Connectors: RJ-45, non-keyed, terminated with 110-style insulation displacement connectors; high impact thermoplastic housing.
  - b. Voice and Data Jacks: 4-pair, pre-wired to T568A configuration, with color-coded indications for T568B configuration.
  - c. Outlets at each location shall be standard 4" by 2-1/8 inches deep boxes with conduit installed to an accessible ceiling space or data-rack closet.
5. Equipment Racks and Cabinets:
  - a. Equipment racks will be floor-mounted.

### Motor Control

1. Motor starters will be provided as manual type for all motors below 1/2 HP.
2. Full voltage, non-reversing, magnetic type starters will be used for all motors 1/2 HP and above.
3. Disconnect switches will be provided as needed for various mechanical and electrical equipment as needed by the NEC.

### Panelboards

1. New panelboards will be UL-labeled, bolt-on breaker type with separate ground bus. Panelboards shall be equal to Square D NQOD and I-Line series panelboards. Panels shall be designed with spare-space available for future growth.

### Disconnect Switches

1. Disconnect switches will be provided where required by NEC and were deemed necessary for safety.
2. Disconnect switches will be either enclosed breaker type or blade type, heavy-duty and sized for proper motor horsepower load disconnecting.

## ELECTRICAL NARRATIVE

### Interior Lighting

1. The lighting system shall include the provisions, installation and connection of lighting panels, lighting contactors, grounding, light fixtures, switches, and other material required for a complete installation.
2. All lighting will be LED. No incandescent or fluorescent fixtures will be used.
3. Lighting will be designed with user input to provide the best lighting types to suit their needs.
4. Light level will be determined per the IES recommended illumination levels for the various categories-tasks.
5. Automatic lighting controls will be designed for the spaces in accordance with applicable energy codes.

### Exterior Lighting

1. An exterior lighting system will be designed as needed and appropriate for the project. All exterior lighting will be LED. Wall-mounted light fixtures will be installed near doors (to include man-doors and overhead vehicle doors). Pole-mounted light fixtures will be provided at the perimeter of the parking/lay-down lot.

### Lighting Controls

1. Automatic lighting controls shall be designed for each space in accordance with applicable energy codes.
2. Each room will be indicated with a lighting control sequence of operation. The sequence will be indicated on the lighting drawings. Mechanical and electrical rooms will be controlled by manual switching for safety reasons.

### Fire Alarm System

1. A new addressable fire alarm system will be provided as needed for the building, including detection devices, pull stations, audio/visual horns/strobes, sprinkler system flow switches, and other devices as required. A fire alarm panel shall be installed in a location as coordinated with the owner.
2. Provide duct smoke detectors, connections, and remote test switches for fire smoke dampers and mechanical equipment as required.
3. A bi-directional antenna amplifier system will be investigated for use by the emergency responders to provide two-way communications throughout the new addition due to the construction of the existing building.
4. Alarm contacts to be available from both the fire alarm and sprinkler system that allow the owner remote indication of when smoke is detected or if the sprinkler system is initiated.

### Security Electronics

1. Conduit and boxes along with Cat 6 cabling will be provided, and the locations coordinated with the Owner as required. This includes but not limited to card access locations and security camera locations. Horizontal cabling shall not exceed 300' from rack to outlet.

### Wi-Fi System

1. Infrastructure (raceways, boxes, and category 6A horizontal cabling) may be provided for connection to owner-provided wi-fi devices. The design of the wi-fi system, if needed, is anticipated to be provided by the owner.

### Mechanical Equipment Connections

1. Provide electrical connections, including disconnects, overloads, etc. for all mechanical equipment. The mechanical equipment will have calculated SCCR ratings indicated on the drawings.

END OF DOCUMENT – RA, MF



## High-Performance Building Standard Guidance for Design and Construction of Municipal Buildings

### Background

The City of Sioux Falls has been a leader on sustainability efforts for years by prioritizing conservation of natural resources, waste reduction and recycling, and energy efficiency initiatives. As the City continues leading by example, incorporating additional sustainability and performance elements into municipal buildings will aid in the long-term investment and legacy of City buildings and achieve positive economic, social, and environmental outcomes. High-performance buildings lower operating costs, improve the health and well-being of occupants, and cut pollution. The High-Performance Building Standard is a set of procedures that promote and operationalize high-performance elements into design and construction of municipal buildings.

### Using the Standard

This guidance is designed to assist City Departments, City Project Managers, and contracted architects and engineers (A/E) to plan for, design, and construct high-performance municipal buildings. The corresponding checklist itemizes the high-performance elements to be included in **new municipal construction**. The checklist should also guide **municipal building remodels** where elements are applicable, although the complete list of elements may be outside the scope of a remodel. The City Project Manager, City Sustainability Coordinator, and A/E will ensure the checklist is followed during the following stages of a project:

- Phase 1 – Project is budgeted and entered into the capital program
- Phase 2 – Scoping and design
- Phase 3 – Construction

### Waiver for Checklist Elements

The checklist should be used for each construction or remodel of municipal buildings; however, certain elements in the checklist may not be practical. Using the following waiver guidelines, the City Project Manager and City Sustainability Coordinator will work with the A/E to understand when an element may need to be waived. Waivers of elements are to be explained in the Explanation section of the checklist.

A waiver of elements in the High-Performance Building Standard may be granted by the City of Sioux Falls if:

- (1) The increased costs of achieving a high-performance building standard cannot be recouped from decreased operational costs within fifteen years; or
- (2) The City of Sioux Falls determines that extenuating circumstances exist that make impractical high-performance building requirements.

## HIGH PERFORMANCE BUILDING STANDARD



## High-Performance Building Standard Checklist

**Project Name:** CIP 20005 – Light and Power Campus Enhancements

**Project Location:** 5225 E 60th Street, Sioux Falls, SD

**Project Construction Timeframe:** 2023 (Design) 2024 (Construction Start)

### Phase 1. Entering Capital Program

Following industry best practice, it is recommended to add 10–15% to a building budget as an initial investment to accommodate high-performance building elements. This investment pays for itself within 15 years or less in lower utility bills.

### Phase 2. Scoping and Design

For each of the sections below, indicate whether a High-Performance Building Standard element is or is not included. Provide an explanation of the element to be used or provide rationale why the element is not being included, in accordance with waiver guidance on page 1.

City Project Manager and Sustainability Coordinator will meet with A/E to review the checklist. A/E returns completed Phase 2 checklist to City Project Manager and Sustainability Coordinator after design is final.

High-Performance Building Element	Included	Not Included	Explanation of Yes or No (For No, refer to waiver guidelines on page 1)
<b>Building Siting</b> Building location and orientation protects natural resources, aids in multimodal and active transportation, and allows for renewable energy.			
Not sited within 100 feet of a wetland or other sensitive natural areas	x		Site not located within 100 feet of any wetlands or sensitive areas
Sited to increase urban density		x	Site for project was pre-determined prior to design
Not sited on pristine greenfield or prime farmland		x	Greenfield site for project was pre-determined prior to design
Site is accessible to pedestrians, bicyclists, and public transit		x	Site for project was pre-determined prior to design outside of existing public transit routes and away from residential areas that would utilize pedestrian and bicycle access. (Nearest bus stop from site is 2 miles away)
Orientation takes advantage of solar potential (passive solar design or onsite solar photovoltaic)		x	Office areas (more densely windowed facades) oriented to face street frontage to north and



## HIGH PERFORMANCE BUILDING STANDARD

High-Performance Building Element	Included	Not Included	Explanation of Yes or No (For No, refer to waiver guidelines on page 1)
			storage areas oriented to be hidden from street view to south.
<b>Energy Demand and Source</b>			
Building is designed to reduce energy demand and operating costs, maximize energy efficiency, improve occupant comfort, and reduce pollution.			
Building is designed to meet one of the following energy codes: ASHRAE 90.1 2016 or 2018 IECC	x		Designed to 2018 IECC
Electric heat pump HVAC system (air source or geothermal), with either electric or natural gas backup	x		Geothermal heat pumps systems with electric boilers and DX cooling to maintain condenser water temps.
Minimum efficiency HVAC required per ASHRAE 90.1 2016 or 2018 IECC	x		Designed to 2018 IECC.
Heat pump water heater	x		Electric boiler(s)
Renewable energy. Examples: rooftop or ground-mount solar, passive solar design, geothermal		x	Roof of cold storage and covered storage has 30 psf additional capacity for rooftop mounted solar field and associated snow load. Geothermal system is proposed for only the Office and Workshop areas of the building.
Building automation system(s)	x		
LED Lighting	x		All lighting will be LED.
Building envelope: Continuous insulation, required per ASHRAE 90.1 2018 or 2018 IECC	x		Continuous insulation will be incorporated in DD & CD phases
Building envelope: Vapor barrier suited for building type	x		Appropriate vapor retarders will be incorporated in DD & CD phases
Building enclosure third-party review	x		Assumed that City will contract a third-party reviewer.
Occupancy sensors	x		Drawings will indicate a sequence of operation on how each space lighting will operate.
<b>Water Conservation</b>			
Water conservation measures reduce utility costs and protect natural resources.			
Low-flow plumbing fixtures	x		
Greywater system		x	
<b>Healthy Occupants and Indoor Air Quality</b>			
Building design and materials support employee health and well-being.			
Building is designed to meet current version of ASHRAE 62	x		
Each occupant can spend the bulk of their time near natural lighting and a view	x		Office areas are located against exterior walls with windows. Clear story lighting above corridor adjacent to Multi-Purpose room. Conference room utilizes shared daylighting from Lobby. Parking and work areas incorporate daylight openings.
Appropriate design for window shading and glare control	x		Majority of office windows are north facing.

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High-Performance Building Element	Included	Not Included	Explanation of Yes or No (For No, refer to waiver guidelines on page 1)
<b>Building Use and Materials</b>			
Building conserves resources by designing for ease of adaptive use over life of the structure, using sustainable and non-toxic materials, and diverting waste.			
Building flexibility and ease of future adaptation	x		Designed for expansion of parking and work areas to the west. Break room can be converted to office spaces in future and new break room added to west or east.
Interior materials, including finishes, furnishings, and other materials, have sustainable components, e.g., are sustainably sourced and/or recycled	x		Sustainable/recycled materials will be incorporated in DD & CD phases Recycled millings utilized at storage yard.
Interior materials are low VOC and non-toxic	x		Low VOC materials will be incorporated in DD & CD phases
Appliances (refrigerator, washing machines, hot water heaters, etc.) are Energy Star certified	x		Appliances provided by owner.
Only energy-efficient hand dryers in public access restroom. Energy-efficient hand dryers and paper towels in employee restrooms.	x		Energy efficient hand dryers will be incorporated in DD & CD phases
<b>Parking and Landscaping</b>			
Green parking and landscaping solutions aid in stormwater infiltration, mitigate the urban heat island effect, conserve resources, and support multimodal and clean transportation.			
No additional parking spaces beyond code requirements are provided	x		Parking provided per City ordinance (1 stall per 1500 sf)
Electric-vehicle charging station(s) or wiring for EV ready		x	Parking areas will be prepared for future EV considerations. Stub outs will be provided for future charging stations.
Bicycle parking		x	Site for project was pre-determined prior to design away from residential areas that would utilize bicycle access.
Paving and hardscapes minimized	x		Recycled millings utilized in storage yard portion of project.
At least 6 inches of topsoil replaced prior to landscaping, based on City standards for CIP projects	x		Topsoil will be replaced in accordance with City requirements
Additional trees beyond minimum standards in § 160.485 LANDSCAPE STANDARDS	x		Existing trees on site will be maintained to greatest extent possible.
Traditional turf grass (e.g., Kentucky bluegrass) minimized and alternatives are used. Examples: buffalo grass, no-mow fescue, xeriscaping, drought-tolerant landscaping, and native plants	x		Low Maintenance / Natural plantings will be utilized to the extent possible
Irrigation is minimized, and rainwater harvesting offsets irrigation	x		Irrigation will be minimized
Stormwater treated onsite through installation of green infrastructure. Examples: rain garden, bioswales, infiltration trenches, living roof/wall	x		Stormwater quality will be addressed on site prior to discharge to maximize infiltration

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Phase 3. Construction

For each of the sections below, indicate whether a High-Performance Building Standard element is or is not included. Provide an explanation of the element to be used or provide rationale why the element is not being included, in accordance with waiver guidance on page 1.

A/E returns completed Phase 3 checklist to City Project Manager and Sustainability Coordinator after construction is complete.

High-Performance Building Element	Included	Not Included	Explanation of Yes or No (For No, refer to waiver guidelines on page 1)
Periodic thermal imaging utilized throughout construction	x		Will be included in construction phase
Construction waste material is diverted from the landfill as first course for disposal. Diverted material is documented.	x		Recycling of appropriate construction waste will be incorporated into specs during DD & CD phases

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